

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets

(11)

Publication number:

**0 033 304
A1**

(12)

EUROPEAN PATENT APPLICATION

(21)

Application number: 81850005.0

(51)

Int. Cl.³: **B 25 D 17/24**

(22)

Date of filing: 12.01.81

(30)

Priority: 24.01.80 SE 8000556

(43)

Date of publication of application:
05.08.81 Bulletin 81/31

(84)

Designated Contracting States:
AT BE CH DE FR GB IT LI NL

(71)

Applicant: Atlas Copco Aktiebolag
Nacka
S-105 23 Stockholm(SE)

(72)

Inventor: Ragnmark, Göran
45, Wahlbomsvägen
S-392 47 Kalmar(SE)

(74)

Representative: Grundfelt, Gunnar et al,
c/o Atlas Copco Aktiebolag Patent Department
S-105 23 Stockholm(SE)

(54)

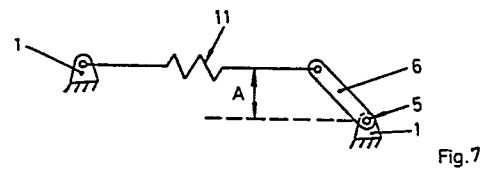
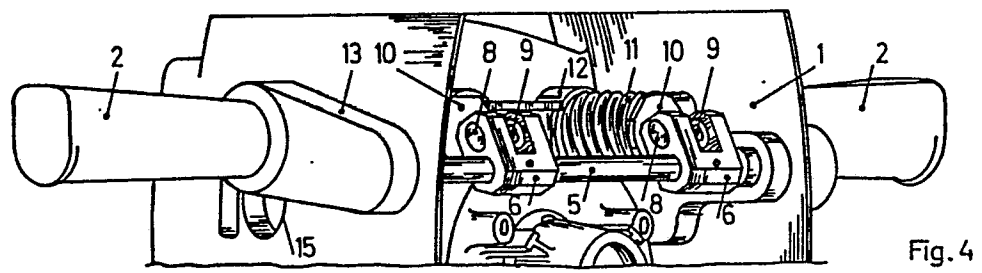
A device for hand-held hammer machines.

(57)

A hand-held hammer machine with handles (2) which via arms (13) are connected with an axle (5) rotatably arranged in a housing (1). The axle is provided with actuation means (6) which move one end of one or more springs (11) along a substantially circular arc shaped curve when the axle (5) is turned. The other end of the spring is supported by a cup-shaped support means (12). Turning of the axle (5) thus results in compression of spring (11) and at the same time a shortening of the moment arm (A) of the spring force so that the moment of the spring force about the axle (5) is substantially constant when feed force is applied against the handles (2).

EP 0 033 304 A1

./...



- 1 -

A device for hand-held hammer machines

The present invention relates to a device for hand-held hammer machines for damping of vibrations transferred to the handles of the machine.

In a prior art device, see U.S. patent 3 275 089, a torsion spring of rubber is used. This spring is vulcanized to the machine housing and to a handle means, which is pivotably journaled relative to the machine housing in the torsion spring. A disadvantage with this design is that a large part of those vibrations which the machine housing is exerted to during operation of the machine is transferred to the handles. This is explained thereby that the force transferred to the handles varies with the moment in the torsion spring, i.e. with the angular position of the handle means relative to the machine housing.

The object of the present invention is to considerably damp the vibrations transferred from the machine housing to the handles. This is achieved by at least one spring being arranged such relative to the handles and the machine housing that the spring is compressed when the handles are pressed down and at the same time the moment arm of the spring force relative to the axis of rotation of the handle means is shortened in such a way that the moment of the spring force about this axis of rotation is substantially constant over the major part of the range of movement

- 2 -

of the handles.

An embodiment is described below with reference to the accompanying drawings in which fig. 1 shows a combined drilling and breaking machine in which the invention is used. Fig. 2 shows a part of the machine from behind with certain parts removed to show the invention. Fig. 3 shows a corresponding view from above. Fig. 4 shows a perspective view from behind with the handles in one angular position. Fig. 5 shows a corresponding view with the handles in another angular position. Figs. 6 and 7 show schematically the operation of the invention. Fig. 8 shows how the force by which the handles are pressed down vary as a function of the downpressing of the handles.

The machine shown in fig. 1 is a combined rock drilling and breaking machine which comprises a machine housing 1. A combustion engine is mounted in the machine housing in the usual way. The combustion chamber of the engine is situated between an engine piston connected to a crank shaft and the hammer piston of the machine. Since the driving of the hammer piston is not essential to the present invention other means, e.g. compressed air, could be incorporated for the driving of the hammer piston instead of the combustion engine. The machine is at its lower end provided with a tool, e.g. a drill rod 3. The machine is furthermore provided with a handle means, incorporating two handles 2, which is pivotally journaled in the machine housing 1. The machine is furthermore provided with a further handle 7 for more precise sideways control of the machine for certain types of operation, e.g. stamping. These handles are preferably made of an elastic material, e.g. polyurethane, in order to obtain good damping of high frequency vibrations.

- 3 -

In figs. 2-5 the upper part of the machine housing 1 is shown with certain parts removed to show a preferred embodiment of the invention. The upper part of the machine housing 1 comprises the crank housing 4 and a transverse axle 5 which is rotatably journalled in the machine housing. The axle 5 is by means of arms 13 connected with the handles 2. The axle 5 is furthermore provided with actuation means 6 in which short axles 8 are rotatably journalled. The arms 13 and the actuation means 6 are connected with the axle 5 by means of pins 14 or in another suitable way. Two helical springs 11 are supported at one end by cup-shaped support means 12 on the machine housing 1 and at the other end by nuts 10. If the machine is driven by compressed air springs 11 could be replaced by air springs. Nuts 10 are by means of adjustment screws connected with the short axles 8. Handles 2 are provided with pins 16 which cooperate with recesses 15 in the machine housing 1 in order to restrict the range of movement of the handles 2.

Figs. 6 and 7 show schematically the operation of the vibration damper. Fig. 6 shows the position of the actuation means 6 when the handles 2 are not loaded. In fig. 7 the actuation means 6 is shown in the position it takes when the handles 2 are near their lower limit position. In this position spring 11 has been compressed substantially so that the spring force has increased substantially. At the same time the moment arm A of the spring force relative to the axis 5 has been shortened. This occurs in such a way that the moment of the spring force about the axis 5 remains substantially constant over the major part of the range of movement of the handles 2. This is shown in fig. 8 which shows how the feed force F applied against the handles 2 varies with the downpressing d in a tested

case. The substantially constant force F which is obtained after a certain downpressing of the handles 2 can be changed by means of the adjustment screws 9. When the machine works and feed force is applied via the handles 2 the machine housing 1 can oscillate in the working direction of the tool 3 without these vibrations being transferred to any substantial degree to the handles 2 and the machine operator.

- 1 -

Claims:

1. A device for hand-held hammer machines for
damping of vibrations transferred to a handle (2)
of the machine, comprising a machine housing (1)
and a handle means (2,13,5,6) pivotally journaled
5 about an axis on the machine housing (1)
characterized thereby
that the device comprises at least one spring (11),
which is arranged in such a way relative to said
handle (2) and said machine housing (1) that said
10 spring is compressed when said handle (2) is pressed
down and at the same time the moment arm (A) of the
spring force relative to said axis (5) is shortened
in such a way that the moment of the spring force
about said axis remains substantially constant over
15 the major part of the range of movement of said
handle (2).

2. A device according to claim 1,
c h a r a c t e r i z e d t h e r e b y
that said handle means comprises two handles (2)
20 each connected with an arm (13) and an axle (5)
rotatably journaled in the machine housing (1),
said axle being connected with said arms (13) at
a distance from said handles (2).

3. A device according to claim 2,
25 c h a r a c t e r i z e d t h e r e b y
that said axle (5) is provided with actuation means
(6) being coupled to said spring (11) in such a way
that one end of the spring is moved along a curve
substantially in form of a circular arc when said
30 axle (5) is turned.

4. A device according to claim 3,
c h a r a c t e r i z e d t h e r e b y

0033304

- 2 -

that the other end of said spring (11) is substantially unmoveable relative to the machine housing (1).

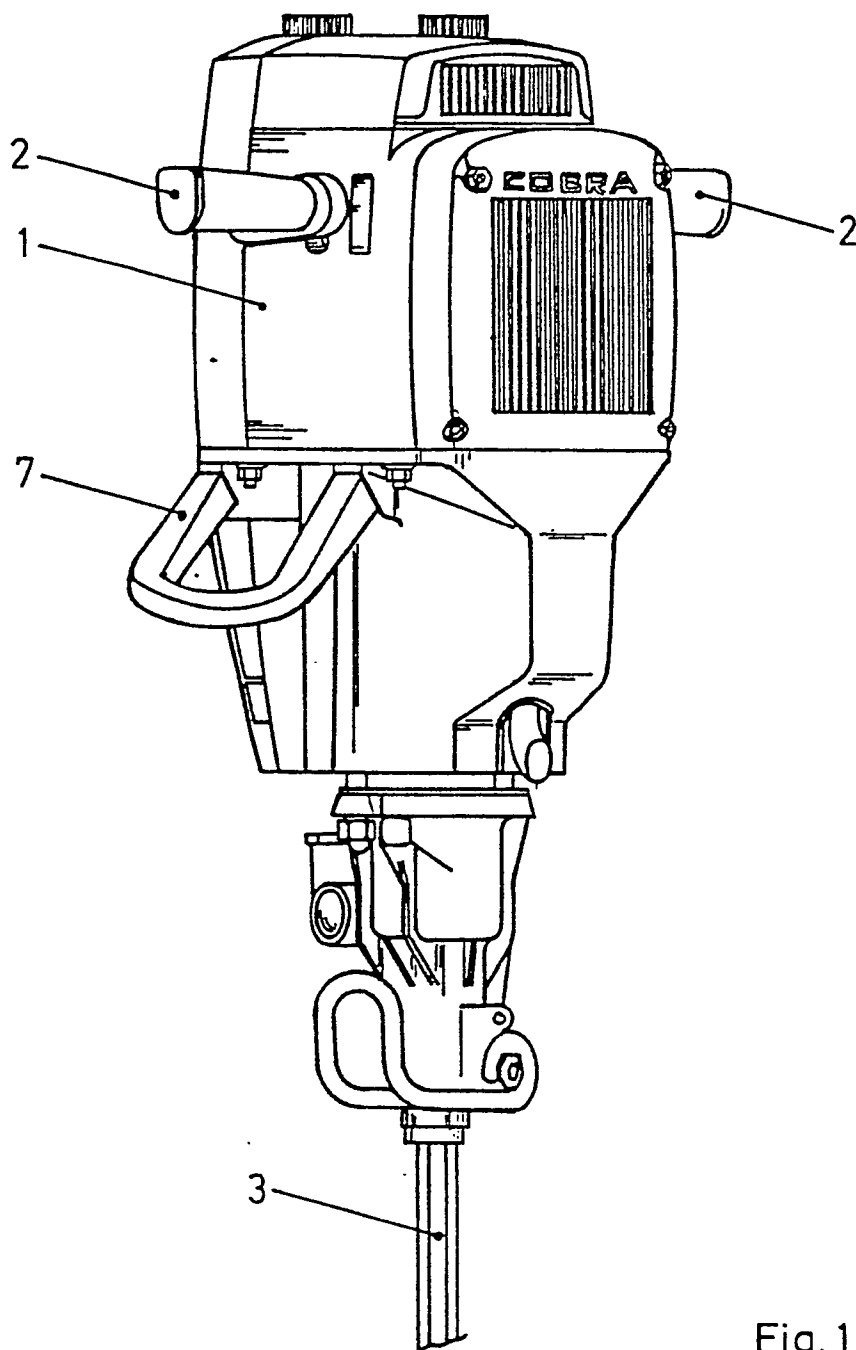


Fig. 1

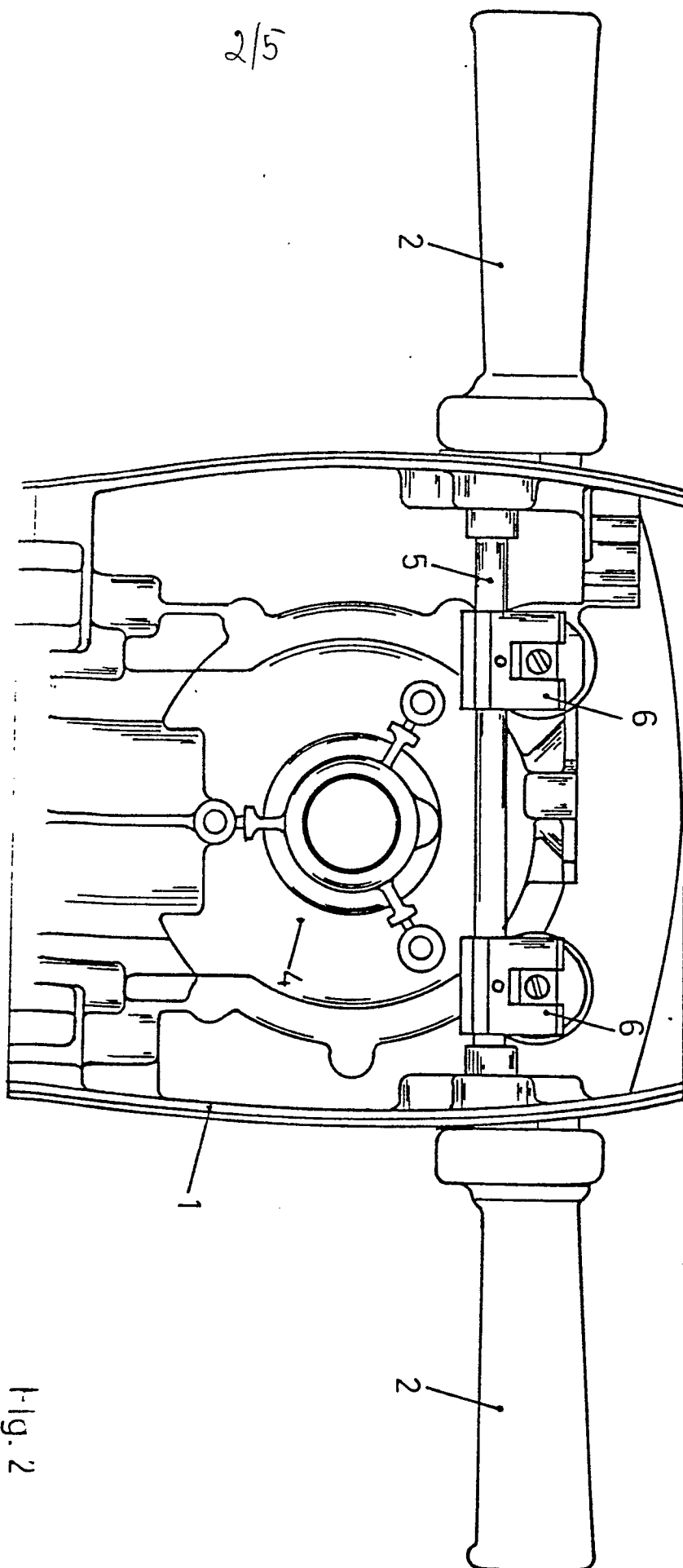
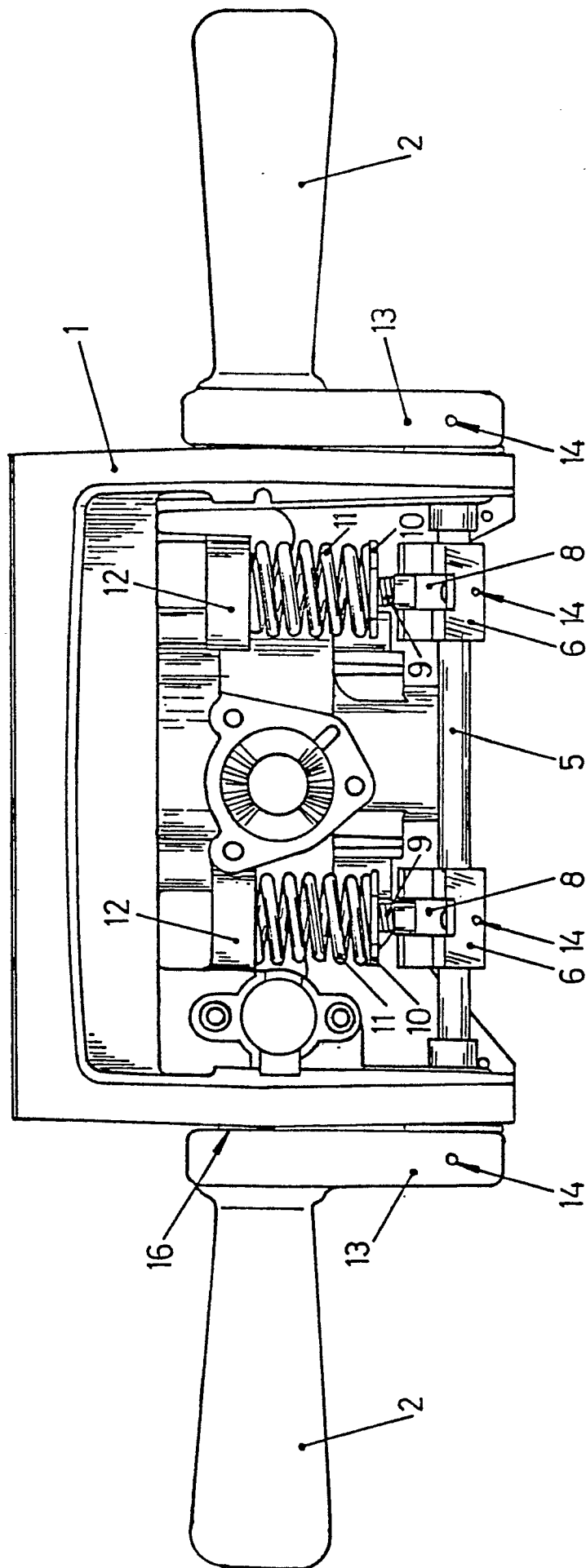


Fig. 2

Fig. 3



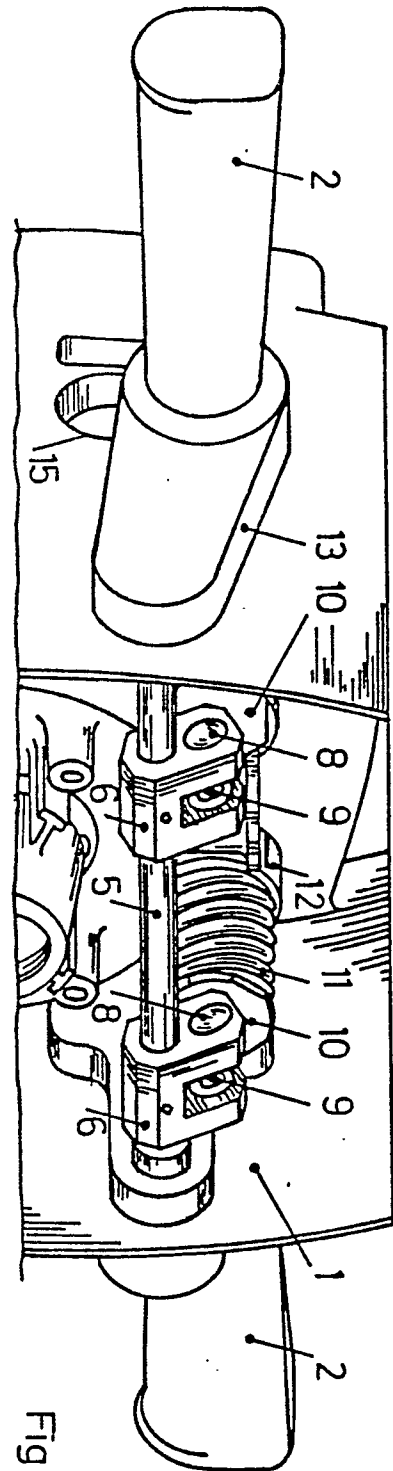


Fig. 4

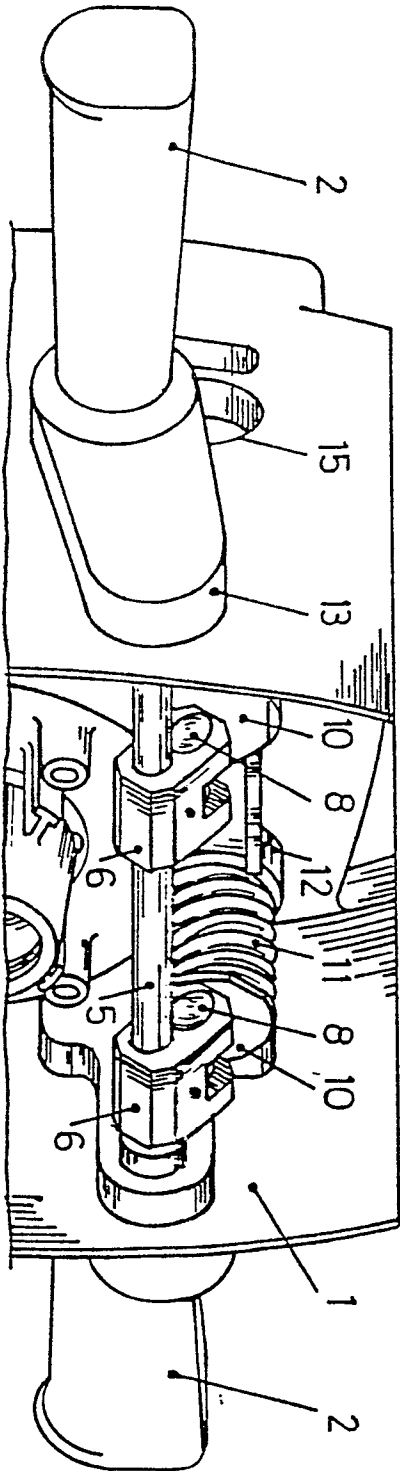


Fig. 5

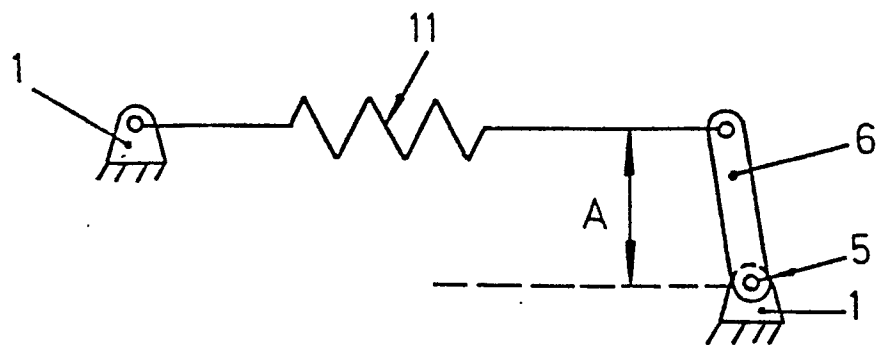


Fig. 6

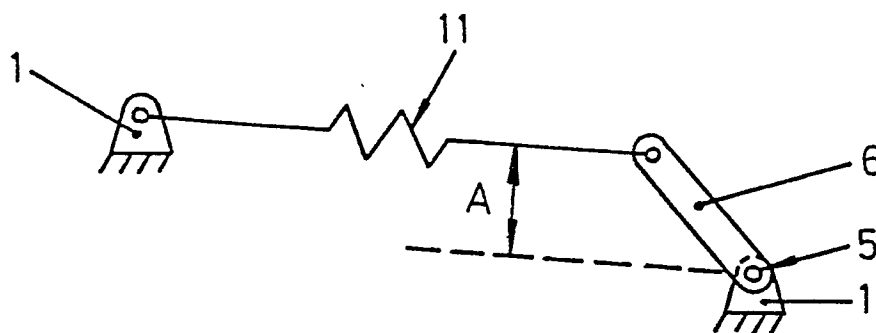


Fig. 7

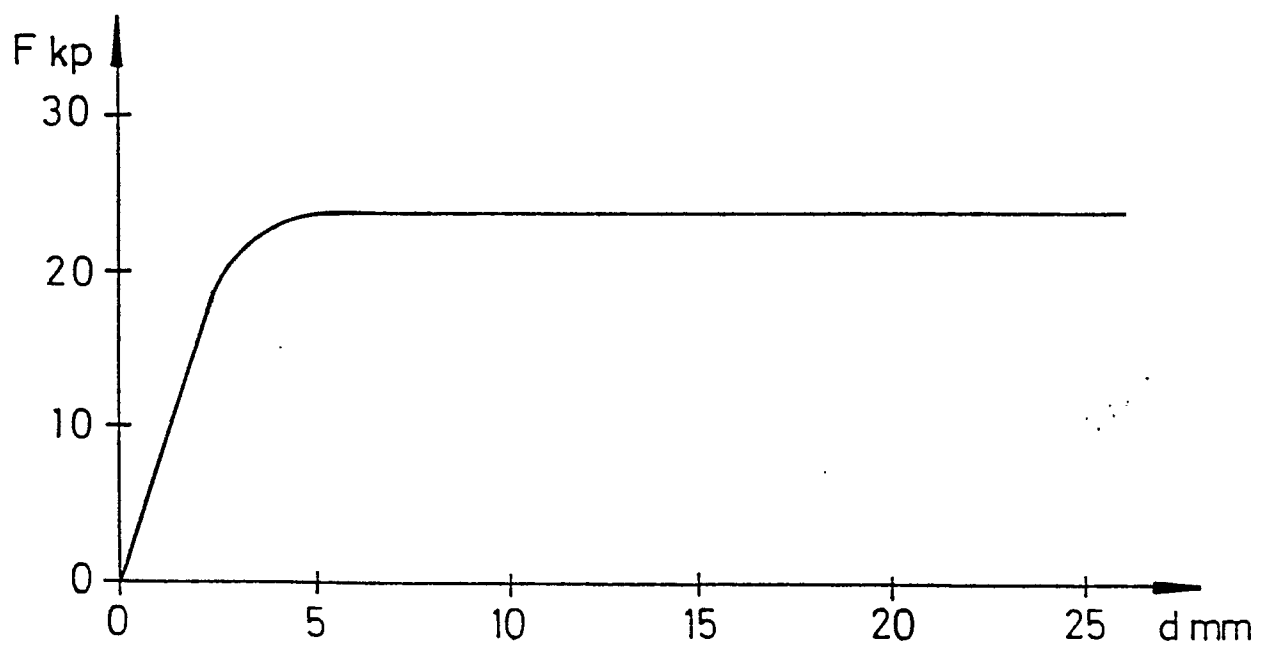


Fig. 8



European Patent
Office

EUROPEAN SEARCH REPORT

0033304

Application number

EP 81 85 0005.0

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	<u>AT - B - 122 752</u> (E. ELSTER) * complete document *	1,4	B 25 D 17/24

	<u>US - A - 1 358 486</u> (R. WILHELM) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
			B 25 D 17/00
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
☒ The present search report has been drawn up for all claims			&: member of the same patent family, corresponding document
Place of search Berlin		Date of completion of the search 15-04-1981	Examiner HOFFMANN